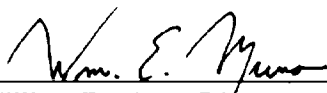


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Five-Year Review Report
for
St. August Sanitary Landfill
St Augusta Township
Stearns County, Minnesota
May, 2003

PREPARED BY:

U.S. EPA - Region 5



William E. Muno, Director
Superfund Division

5/28/03
Date

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List of Acronyms

ARAR	Applicable or Relevant and Appropriate Requirement
CD	Consent Decreed
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
EPA	United States Environmental Protection Agency
GWOU	Groundwater Operable Unit
MPCA	Minnesota Pollution Control Agency
NOC	Notice of Compliance
O & M	Operation and Maintenance
PAH	Polyaromatic Hydrocarbon
PCB	Polychlorinated Biphenyl
PCOR	Preliminary Close Out Report
PRP	Potentiall Responsible Party
RA	Remedial Action
RD	Remedial Design
RAO	Remedial Action Objective
RI/FS	Remedial Investigation/Feasibility Study
RFRA	Request For Response Action
RPM	Remedial Project Manager
VOC	Volatile Organic Compounds

Executive Summary

On January 22, 1991, the Minnesota Pollution Control Agency (MPCA) issued a statement to sixteen parties concerning the St. Augusta Sanitary Landfill/Engen Dump Superfund Site. The statement was to inform these Potential Responsible Parties (PRPs) that MPCA was going to issue a Request for Response Action (RFRA). The RFRA provided the framework for all the activities which investigate and remediate a hazardous waste site. The RFRA requested that thorough Remedial Investigation be conducted to determine the extent and magnitude of contamination and a Remedial Action Plan be developed to implement final response actions. The RFRA also requested an Interim Response Action at the Site to study and implement groundwater gradient control. The MPCA enforced a State Order to implement the RFRA.

The St. Augusta Sanitary Landfill was a qualified landfill under the Minnesota Landfill Cleanup Law. The Landfill Cleanup Law establishes a dedicated source of funds to enable the MPCA to perform all necessary response, operation and maintenance activities at qualified landfills. This new law enables the MPCA to conduct response actions at sites listed on the EPA's National Priorities List (NPL) by taking the enforcement lead and overseeing the completion of remedy construction at numerous NPL sites in Minnesota. The MPCA conducted waste relocation activities in 1996, and the last of a final cover was constructed over the Site in 1997. The final cover system included a geomembrane barrier layer, 2 ½ feet of cover soils, passive gas venting wells and surface water run off controls.

The Site achieved construction completion with the signing of the Preliminary Close Out Report on September 26, 2000. The trigger for this five-year review was the Remedial Action Start date.

The assessment of this five-year review found that the remedy was constructed in accordance with the requirements of MPCA, the remedy is functioning as designed, source control measures (cover over the landfill) has achieved its design criteria by significantly reducing both the production of leachate and toxicity of the compounds released from the landfill, and since the cover was constructed, there has been a reduction in the contaminant concentrations in the groundwater.

FIVE-YEAR REVIEW SUMMARY FORM

SITE IDENTIFICATION		
Site name (from WasteLAN): St. Augusta Sanitary Landfill		
EPA ID (from WasteLAN): MND98100225		
Region: 5	State: MN	City/County: Near St. Cloud/Stearns County
SITE STATUS		
NPL status: <input type="checkbox"/> Final <input checked="" type="checkbox"/> Deleted <input type="checkbox"/> Other (specify) _____		
Remediation status (choose all that apply): <input type="checkbox"/> Under Construction <input type="checkbox"/> Operating <input checked="" type="checkbox"/> Complete		
Multiple OUs?* YES <input checked="" type="checkbox"/> NO	Construction completion date: <u>9</u> / <u>26</u> / 2000	
Has site been put into reuse? YES <input checked="" type="checkbox"/> NO <input type="checkbox"/> Portions		
REVIEW STATUS		
Lead agency: <input type="checkbox"/> EPA <input checked="" type="checkbox"/> State <input type="checkbox"/> Tribe <input type="checkbox"/> Other Federal Agency _____		
An author name: Gladys Beard/ State PM Name Travis Peterson		
Author title: NPL State Deletion Process Manager	Author affiliation: U.S. EPA, Region 5	
Review period: ** <u>12</u> / <u>04</u> / <u>01</u> to <u>02</u> / <u>21</u> / <u>03</u>		
Date(s) of site inspection: ____ / ____ / ____		
Type of review: <div style="display: flex; justify-content: space-between;"> <div> <input checked="" type="checkbox"/> Post-SARA <input type="checkbox"/> Non-NPL Remedial Action Site <input type="checkbox"/> Regional Discretion </div> <div> <input type="checkbox"/> Pre-SARA <input checked="" type="checkbox"/> NPL State/Tribe-lead </div> <div> <input type="checkbox"/> NPL-Removal only </div> </div>		
Review number: X 1 (first) 2 (second) 3 (third) Other (specify)		
Triggering action: <div style="display: flex; justify-content: space-between;"> <div> Actual RA Onsite Construction at OU # _____ Construction Completion Other (specify) _____ </div> <div> <input checked="" type="checkbox"/> Actual RA Start at OU# _____ Previous Five-Year Review Report </div> </div>		
Triggering action date (from WasteLAN): <u>05</u> / <u>11</u> / <u>1996</u>		
Due date (five years after triggering action date): <u>09</u> / <u>16</u> / <u>01</u>		

* ["OU" refers to operable unit.]

** [Review period should correspond to the actual start and end dates of the Five-Year Review in WasteLAN.]

FIVE-YEAR REVIEW SUMMARY FORM, cont'd

Issues:

Continue with routine site maintenance including annual mowing of the vegetative cover, site inspections of cover. Continue with groundwater sampling program.

Recommendation and Follow-up Actions:

The frequency of sampling for inorganic parameters should be increased to twice per year in order to define trends for these parameters. In addition, boron and sodium should be added to the parameter list. VOC sampling should continue three times per year to establish trends in the new monitoring wells. The two residential wells should be sampled during the next sampling season. Gas monitoring should be conducted semi-annually.

Continue with routine site maintenance and annual mowing to the cover, site inspection and groundwater sampling.

During 2000, an analysis was done to determine the potential methane production and related feasibility for operating an active gas extraction system at the site. Results of the study show that the site could maintain a flare for the destruction of gasses collected. Because of this, an active gas system was constructed during 2002.

Protectiveness Statement(s):

All immediate threats at the site have been addressed, and the remedy is protective in the short-term of human health and the environment.

Long-Term Protectiveness:

Long-term protectiveness at the St. Augusta Sanitary Landfill Superfund site (the Site) will be achieved by continuing the long-term monitoring of the ground water system. Long-term groundwater monitoring has demonstrated that the concentrations of the chemicals of concern have declined close to or below cleanup goals. Long-term trends show significant and adequate improvements in ground water quality.

The source control provided is a geomembrane barrier layer, 2 ½ feet of cover soils, passive gas venting wells and surface water run off controls. The cover has achieved its design criteria by significantly reducing both the production of leachate and the toxicity of the compounds released from the Site's landfill. Maintenance of the Site's landfill covers such as mowing, inspections for erosion or other damage and maintaining proper slopes for positive drainage off the fill area, will continue in order to maintain the integrity of the cover system.

Other Comments:

None.

**St. Augusta Sanitary Landfill
St. Augusta Township, Minnesota
First five-year Review Report**

I. Introduction

The purpose of the five-year review is to determine whether the remedy at a site is protective of human health and the environment. The methods, findings, and conclusions of reviews are documented in Five-Year Review reports. In addition, Five-Year Review reports identify issues found during the review, if any, and identify recommendations to address them.

The Agency is preparing this Five-Year Review report pursuant to CERCLA §121 and the National Contingency Plan (NCP). CERCLA §121 states:

If the President selects a remedial action that results in any hazardous substances, pollutants, or contaminants remaining at the site, the President shall review such remedial action no less often than each five years after the initiation of such remedial action to assure that human health and the environment are being protected by the remedial action being implemented. In addition, if upon such review it is the judgement of the President that action is appropriate at such site in accordance with section [104] or [106], the President shall take or require such action. The President shall report to the Congress a list of facilities for which such review is required, the results of all such reviews, and any actions taken as a result of such reviews.

The Agency interpreted this requirement further in the NCP; 40 CFR §300.430(f)(4)(ii) states:

If a remedial action is selected that results in hazardous substances, pollutants, or contaminants remaining at the site above levels that allow for unlimited use and unrestricted exposure, the lead agency shall review such action no less often than every five years after the initiation of the selected remedial action.

The Minnesota Pollution Control Agency (MPCA) and the United States Environmental Protection Agency (EPA), Region 5, conducted the five-year review of the remedy implemented at the Site. This review was conducted by the Project Managers for the entire site from December 2001 through February 2003. This report documents the results of the review.

This is the first five-year review for the Site. The triggering action for this five-year review is the completion of the actual start of the remedial action May 11, 1996. The five-year review is required due to the fact that hazardous substances, pollutants, or contaminants remain at the site above levels that allow for unlimited use and unrestricted exposure.

I. Site Chronology

Table 1 - Chronology of Site Events

Event	Date
NPL RP Search	11/15/1985
NPL RP Search	09/29/1995
Removal Assessment	11/29/1989
Removal Assessment	09/21/1990
Removal Assessment	09/21/1989
Proposal to NPL	09/18/1985
Final listing on EPA National Priorities List	07/22/1987
Request For Response Action (RFRA)	01/22/1991
Remedial Investigation/Feasibility Study Negotiations	02/15/1991
Remedial Investigation/Feasibility Study (PRP RI/FS)	03/30/1994
Remedial Action	11/02/1997
Preliminary Close Out Report signed	09/26/2000
Notice Of Intent to Delete	07/22/1996
Deletion from the NPL	11/14/1996

III. Background

Physical Characteristics

The St. Augusta Sanitary Landfill/Engen Dump is located in Stearns County, St. Augusta Township (T123N, R28W, Sect. 7 & 12) and received its first permit to accept waste on May 17, 1971, and continued operating until April 1982. The site is bounded by the Mississippi River on the northeast, Johnson Creek on the southeast, Interstate Highway 94 on the west, and privately owned land to the south and the north. Figure 1 shows the site location with respect to local roads and highways.

Land and Resource Use

In accordance with the legislation enacted in 1992, (Minn. Laws 1992, Ch. 513, Art. 2, Sec. 2, Subd.3), the Minnesota Pollution Control Agency (MPCA) assessed and classified closed landfills in Minnesota. According to that assessment and classification, the Site's landfill was given a rank of B and a score of 22. During the 1998 forum, the site team re-scored the site to a rank of D and a score of 6. This classification may be revised annually as needed, the rank of D indicated that this landfill currently poses no threat to the public health or the environment. During the 2000 forum, the site team reclassified the Landfill with a ranking of B and a score of 21. The Landfill was re-scored in response to methane issues surrounding the site.

The St. Augusta Sanitary Landfill/Engen Dump is 48 acres in size including the South Engen Dump and contains approximately 1,100,000 yards of waste. The Landfill was under private ownership when in operation.

The Engen Dump consists of two areas approximately 11 acres and 8 acres in size. The St. Augusta Landfill is approximately 16 acres in size. A borrow pit that was used to provide cover material for the St. Augusta Landfill is located on the northern side of the landfill.

A Binding Agreement was signed on April 12, 1996. A Notice of Compliance was issued in May 1996.

History of Contamination

Landfilling operations were conducted at the dump and landfill between 1966 and 1982. The site was the primary waste disposal site for the St. Cloud area during this time. The Engen Dump began to receive municipal, commercial, and industrial wastes in 1966. The industrial wastes disposed of at the dump consisted of ground glass, solids and sledges, paper pulp waste, ash and small amount of cutting oils, coolants, solvents, paints and cleaning compounds. The dump was phased out of operation between 1971 and 1972 and portions of the dump were covered with on-site soils.

Initial Response

In June of 1985, the site was given a score of 34 under the Superfund program hazard ranking system score. The site was proposed for the Federal National Priorities List (NPL) on September 8, 1985. The listing was finalized on July 22, 1987.

A September 1992 Groundwater Operable Unit Remedial Investigation/Feasibility Study (RI/FS) was prepared to fulfill the requirements of the Request for Response Action (RFRA) issued by the Minnesota Pollution Control Agency (MPCA) in 1993. The MPCA did an investigation of the Site and identified that volatile organic hydrocarbons and heavy metals had contaminated the groundwater beneath and in the area of the Site. MPCA files showed that solvents, leaded paint wastes, ashes from incinerated paint sludge, and materials containing lead and barium were disposed of at the Site. Groundwater contamination by hazardous substances beneath the Site has been confirmed. No other sources of contamination adjacent or upgradient to the Site have been identified.

Basis for Taking Action

Contaminants

Hazardous substances that have been released at the Site in each media include:

Soil and Groundwater

Acetone	Trans-1,2-Dichloroethane	Barium
Benzene	1,2-Dichloroethane	
Toluene	Methylene chloride	
m-xylene	Trichloroethene	
Tetrahydrofuran	Methyl isobutyl ketone	
Methyl ethyl ketone	Tetrachloroethene	
Ethylbenzene	Cumene	
p-xylene and o-xylene	1,4-Dichlorobenzene	
1,1-Dichloroethane	1,2-Dichloroethane	
Trans-1,2-Dichloroethylene	arsenic	
1,2-Dichloroethane	Mercury	
Methylene chloride	Lead	

Exposure to soil and groundwater leachate is associated with significant human health risks, due to exceedance of EPA's risk management criteria for either the average or the reasonable maximum exposure scenarios. The carcinogenic risks were exposures to all media due to the high concentrations of carcinogenic polyaromatic hydrocarbons (PAHs) and volatile organic compound (VOC). Potential risks associated with exposure to the site are attributed to the presence of a variety of VOC contaminants that exist at concentrations that exceed State and Federal MCLs. Implementation of the remedies has eliminated exposure routes.

IV. Remedial Actions

Remedy Selection

In 1994, the Legislature of the State of Minnesota enacted the Landfill Cleanup Law, Minn. Laws 1994, ch. 639, codified at Minn. Stat. § § 115B.39 to 115B.46 (the Act), authorizing the Commissioner of the Minnesota Pollution Control Agency (MPCA) to assume responsibility for future environmental response actions at qualified landfills that have received notices of compliance from the Commissioner of MPCA. Additionally, the Act established funds to enable the MPCA to perform all necessary response, operation and maintenance at such landfills. At sites where no responsible parties are conducting response actions under CERCLA, MPCA is responsible for issuing a notice of compliance, after it determines that all work that could be expected under a state order or under state closure requirements has been completed.

In 1996, MPCA decided to implement a final remedy for the St. Augusta Landfill/Engen Dump. The remedy for the Site included:

- Relocation of waste from the Land Investors Site to the St. Augusta Landfill in 1996 for the purpose of consolidating nearby waste disposal sites and improving final slope at the St. Augusta Landfill.
- Relocation of waste from the North Engen Dump to the St. Augusta Landfill in 1996 for the purpose of consolidating nearby waste disposal sites to reduce final cover areas, clearing a soil borrow area for use during 1997 cover construction, and improving final slope at the St. Augusta Landfill.
- A surface water runoff control system, consisting of surface water diversion berms, inlet structures, drop pipes energy dissipation structures.
- The installing of a passive gas venting system at the St. Augusta Landfill.

Remedy Implementation

When the St. Augusta Landfill closed in April, 1982, the landfill was covered with 12-18 inches of onsite soils. When the Engen Dump closed no final cover was in place. As part of the final cover construction project approximately 240,000 cu. yd. of waste from the North Engen Dump, and 25, 600 cu. yd. from the Land investors site was excavated and add to the St. Augusta footprint to improve the slope for better surface water drainage, and to consolidate the overall waste footprint. Waste relocation activities took place in 1996, and final cover construction over the remaining St. Augusta and South Engen Dump footprints took place in 1997. The final cover system included a geomembrane barrier layer, 2 ½ feet of cover soils, passive gas venting wells and surface water run off controls. An active gas system was installed in 2002.

System Operation/Operation and Maintenance

The frequency of sampling for inorganic parameters should be increased to twice per year in order to define trends for these parameters. In addition, boron and sodium should be added to the parameter list. VOC sampling should continue three times per year to establish trends in the new monitoring wells. The two residential wells should be sampled during the next sampling season. Gas monitoring should be conducted semi-annually.

There are nine landfill gas monitoring points at the St. Augusta Sanitary Landfill. MPCA has tested gas from the nine gas probes three times this year. Table 1 (attachment) shows methane levels measured in the probes in 1999 through 2001.

Table 2 - Annual System Operations/O&M Costs

Dates		Total Cost rounded to nearest \$1,000
From	To	
12/04/01	02/21/02	\$ 50,000

V. Progress Since the Last Five-Year Review

This was the first-year review for the site.

VI. Five-year Review Process

Administrative Components

This Five-Year Review Report was written and completed by EPA, based on the technical review of the Site by members of the MPCA staff. This Five-Year Review Report was written by Gladys Beard of EPA.

From December 2001 to February 2002 the review team established the review schedule whose components included:

- Community Involvement;
- Document Review;
- Data Review;
- Site Inspection;
- Local Interviews; and
- Five-Year Review Report Development and Review.

The schedule extended through September 2002.

Community Involvement

A notice will be made to the public announcing the completion of the Five-Year Review Report and providing a summary of Five-Year Review findings, protectiveness of the remedy, and advising the community where a copy of the review report can be found. This Five-Year Review Report can be found in the Site's Information Repository.

Document Review

This Five-Year Review consisted of a review of relevant documents including O&M records, monitoring data, and the MPCA's February 21, 2002 report titled "2001 Annual Report." All cleanup standards were reviewed.

Data Review

Groundwater Monitoring

Groundwater monitoring has been conducted at the Site since the 1980s. In general, most contaminants were detected at their highest levels early in the RI/FS history of the Site.

Three rounds of water quality sampling were performed in May, September, and November, 2001. The samples were collected and analyzed by personnel at Interpoll Laboratories (Interpoll). The samples are collected from ten monitoring wells. No surface water samples were collected in 2001. Figure 2 shows the location of the existing and some of the former monitoring wells. Groundwater levels were measured in each of the wells when they were sampled for water quality analyses.

Historical reports indicate that there are three aquifers beneath the site: the upper or water table aquifer, the middle aquifer, and the lower aquifer. All three of these aquifers are sand or silty sand layers within the glacial till. The monitoring wells are screened in the three aquifers and the water levels measured in them reflect groundwater flow patterns in each of the aquifers. Groundwater levels in the upper aquifer during the May sampling event were unusually high compared to recent years. It was not possible to construct a meaningful contour map using data from the upper aquifer wells for May 31-June 1. State climatology data for the months of April and May, 2001, show significantly higher precipitation compared to previous years for those months. Figure 3 shows the groundwater flow direction in the upper aquifer on November 5, 2001. The map shows that groundwater flow is primarily toward the southeast in the upper aquifer, probably discharging to Johnson Creek.

Figure 4 shows the groundwater elevations during the May 31-June 1 sampling event in the lower aquifer. Groundwater flow in the lower aquifer is primarily to the east.

Analyses of samples from monitoring wells MW-13U, MW-17, MW-20U, MW-21U, MW-22 and

MW-23 can be used to characterize the groundwater quality in the upper aquifer. Monitoring wells MW-13U, MW-20U and MW-21U were installed in the spring of 1998. MW-13U was first sampled in 1998 and showed only trace or low levels of several organic compounds. In MW-17, concentrations of total VOCs have stabilized in the late 1990s. Figure 5 shows historical groundwater quality trends for MW-17. Monitoring wells MW-20U and MW-21U were first sampled in August, 1998. Both wells show moderate levels of VOCs, but sharp declines in total VOC concentrations occurred in 2001. This seems to correlate with the high water tables and high precipitation in April and May. These conditions may have caused a dilution effect causing the declines in concentrations in some parts of upper aquifer where recharge to the aquifer may have been relatively rapid.

MW-22 and MW-23 continue to show relatively high levels of VOC, but they also showed a decline in 2001. MW-22, which is next to the St. Augusta Landfill shows much higher VOC concentrations than MW-23 which is immediately downgradient of the former Engen Dump. This indicated that the landfill is having less of an impact on the groundwater as it moves east from the Landfill and passes beneath the former dump.

Monitoring wells MW-19, MW-20 and MW-21M are screened in the middle aquifer. In general total VOC concentrations in the aquifer declined in 2001, but not as much as in the upper aquifer. MW-21M was constructed in 1998 and first sampled in August, 1998. The 2000 data indicate fairly high levels of VOCs, but lower than those measured in 1998 and 1999. It is not certain whether or not VOC concentrations in the middle aquifer have become stabilized. Figure 7 shows trends for two of the monitoring wells in the middle aquifer.

Monitoring wells MW-12, MW-13, MW-14, and MW-18 are screened in the lower aquifer. MW-12 is an upgradient well that has shown the occasional presence of volatile organic compounds that may be due to sampling or analytical error or may represent impacts from an upgradient source. Monitoring wells MW-13 and MW-14 show only trace to low levels of VOCs. The trend in total VOC concentrations in samples of MW-14 is shown on Figure 6. Although these wells are downgradient of the landfill, they lie to the southeast of the fill, while most of the contamination appears to be moving east or northeast toward the Mississippi river. MW-18 has shown no significant concentrations of VOCs. A total VOC concentration of 16.69 (micrograms/liter, ug/l) was found in the November sample of MW-18. However, this sharp increase is largely due to the presence of 16 ug/l of acetone which may be a lab or field contaminant. There does not appear to be a serious impact on groundwater quality, in terms of VOCs, in the lower aquifer based on existing monitoring wells. However, a former lower aquifer well abandoned in 1997, MW-15 (see Figure 7), had shown fairly high concentrations of total VOCs.

Inorganic chemical parameters have also been analyzed in samples of the monitoring wells. The compounds evaluated for this report include arsenic, barium (an element found in some of the industrial waste disposed at this landfill), chloride, nitrate, ammonia, and sulfate. Arsenic concentrations have been found in several wells and have exceeded the federal drinking water standard of 50 micrograms per liter (MW-17) in past years. Barium levels range from background

levels to five times background in some down gradient wells, especially former wells MW-15 and MW-16.

Chloride, the nitrogen compounds, and sulfate levels are typical of groundwater impacted by landfill leachate. Although deep aquifer wells MW-13 and MW-14 only show trace levels of VOCs, it is noted that they show significant levels of chloride and sulfate, possibly indicating that these contaminants are more mobile in the deep aquifer than the VOCs

Chloride is a reliable indicator of leachate impacts because it is not affected by sampling techniques, it is very mobile in groundwater, and it does not biodegrade. The upper and middle aquifers both show high chloride levels throughout the monitoring system, while the deep aquifer shows levels one-third to two-thirds as high as the upper two aquifers (see Figures 5, 6, and 8). Although the total VOC concentration increase at MW-18 was attributed to a possible artifact, it should be noted that chloride concentrations have increased over the past few years in samples of this well. MW-14, another deep aquifer monitoring well also shows an increase in chloride concentrations in 2001 (see Figure 6). Future reports will attempt to quantify trends in the chloride concentrations which may be more useful than VOC trends in determining whether or not groundwater quality has stabilized in the lower aquifer.

Surface Water Monitoring

There are no routine surface water sampling stations at the St. Augusta Landfill. However, MW-17 is at the end of the bluff before the Mississippi River and surface water standards have not been exceeded in that well. It may be useful to sample Johnson Creek for possible impacts.

Site Inspection

Regular inspections related to the landfill conditions were completed during 2001. No major issues were identified in these inspections. Site inspections take place on a regular basis and will continue on a long-term basis. The overall condition of the final cover is good. The vegetation is well established except on the lower portion of the east sideslope by the access road where stressed vegetation and bare ground was observed due to gas migration. Only very minor settlement was observed with minimal effects to surface drainage. Surface drainage and surface water holding areas are all working well.

Interviews

In processing this report U.S. EPA interviewed the MPCA to obtain information. None of MPCA staff were able to identify any concerns regarding the Site and there had not been any emergency responses at the Site.

VII. Technical Assessment

Question A: Is the remedy functioning as intended by the decision documents?

The review of documents, ARARS, risk assumptions, and the results of the site inspection indicates that the remedy is functioning as intended by the MPCA Clean-up Program. The stabilization and capping of contaminated soils and sediments has achieved the remedial objectives to minimize the migration of contaminants to groundwater and surface water and prevent direct contact with, or ingestion of, contaminants in soil and sediments.

Operation and maintenance (O&M) of the cap and wells has been effective. O&M annual costs are consistent with original estimates and there are no indications on any difficulties with the remedy.

No activities were observed that would have violated the site entrance to St. Augusta Landfill. The cap and the surrounding area were undisturbed, and no new uses of groundwater were observed. The Site entrance is intact and in good repair.

Question B: Are the exposure assumptions, toxicity data cleanup levels and remedial action objectives (RAOs) used at the time of the remedy selection still valid?

Changes in Exposure Pathways, Toxicity, and Other Contaminant Characteristics

The exposure assumptions used to develop the Human Health Risk Assessment included both current exposures (older child trespasser, adult trespasser) and potential future exposures (young and older future child resident, future adult resident and future adult worker). There have been no changes in the toxicity factors for the contaminants of concern that were used in the baseline risk assessment. These assumptions are considered to be conservative and reasonable in evaluating risk and developing risk-based cleanup levels. No change to these assumptions, or the cleanup levels developed from them is warranted. There has been no change to the standardized risk assessment methodology that could affect the protectiveness of the remedy. The remedy is progressing as expected and it is expected that all groundwater cleanup levels will be met within approximately time frame stated by MPCA Clean-up Program.

Question C: Has any other information come to light that could call into question the protectiveness of the remedy?

No ecological targets were identified during the baseline risk assessment and none were identified during the five-year review, and therefore monitoring of ecological targets is not necessary. All sediment and surface water samples analyzed found no contamination of wetlands or surface water. No weather-related events have affected the protectiveness of the remedy. There is no other information that calls into question the protectiveness of the remedy. There have been no changes in the physical conditions of the site that would affect the protectiveness of the remedy.

Technical Assessment Summary

According to the data reviewed, the site inspection, and the interviews, the remedy is functioning as intended by the MPCA Clean-up Program. There have been no changes in the physical conditions of the site that would affect the protectiveness of the remedy. There has been no changes in the toxicity factors for the contaminants of concern that were used in the baseline risk assessment, and there have been no changes to the standardized risk assessment methodology that could affect the protectiveness of the remedy. There is no other information that calls into question the protectiveness of the remedy.

VIII. Issues

Table 3 - Issues

Issue	Currently Affects Protectiveness (Y/N)	Affects Future Protectiveness (Y/N)
Continue with routine site maintenance including annual mowing of the vegetative cover and site inspections of the cover's integrity.	N	N
Continue with groundwater sampling and at end of the bluff continue surface water sampling program.	N	N

IX. Recommendations and Follow-Up Actions

Table 4 - Recommendations and Follow-Up Actions

Issue	Recommendations Follow-up Actions	Party Responsible	Oversight Agency	Milestone Date	Affects Protectiveness? (Y/N)	
					Current	Future
Evaluate potential migration of ground water contaminants	Additional sampling and ground water analysis	State	State	Within the next 6 months	N	Y
Continue with routine site Maintenance	Annual mowing to the cover, site inspection and groundwater	State	State	Annually	N	N

Issue	Recommendations Follow-up Actions	Party Responsible	Oversight Agency	Milestone Date	Affects Protectiveness? (Y/N)	
					Current	Future
gas vent well monitoring network was install around the landfill during 2002.	Monitoring to detect migration of landfill gas and thereby evaluate the effectiveness of the newly installed active gas system	State	State	2003	N	N

X. Protectiveness Statement

The remedy is protective in the short-term of human health and the environment. All immediate threats at the site have been addressed. All threats at the Site have been addressed through stabilization and capping of contaminated soil and sediments, the installation of fencing and warning signs, and the implementation of institutional controls.

Long-term protectiveness of human health and the environment will be achieved upon attainment of groundwater cleanup goals, through natural attenuation. In the interim, exposure pathways that could result in unacceptable risks are being controlled and institutional controls are preventing exposure to, or the ingestion of, contaminated groundwater.

Long-term protectiveness of the remedial action will be verified by obtaining additional groundwater samples to fully evaluate potential migration of the contaminants. Current monitoring data indicate that the remedy is functioning as required to achieve groundwater cleanup goals.

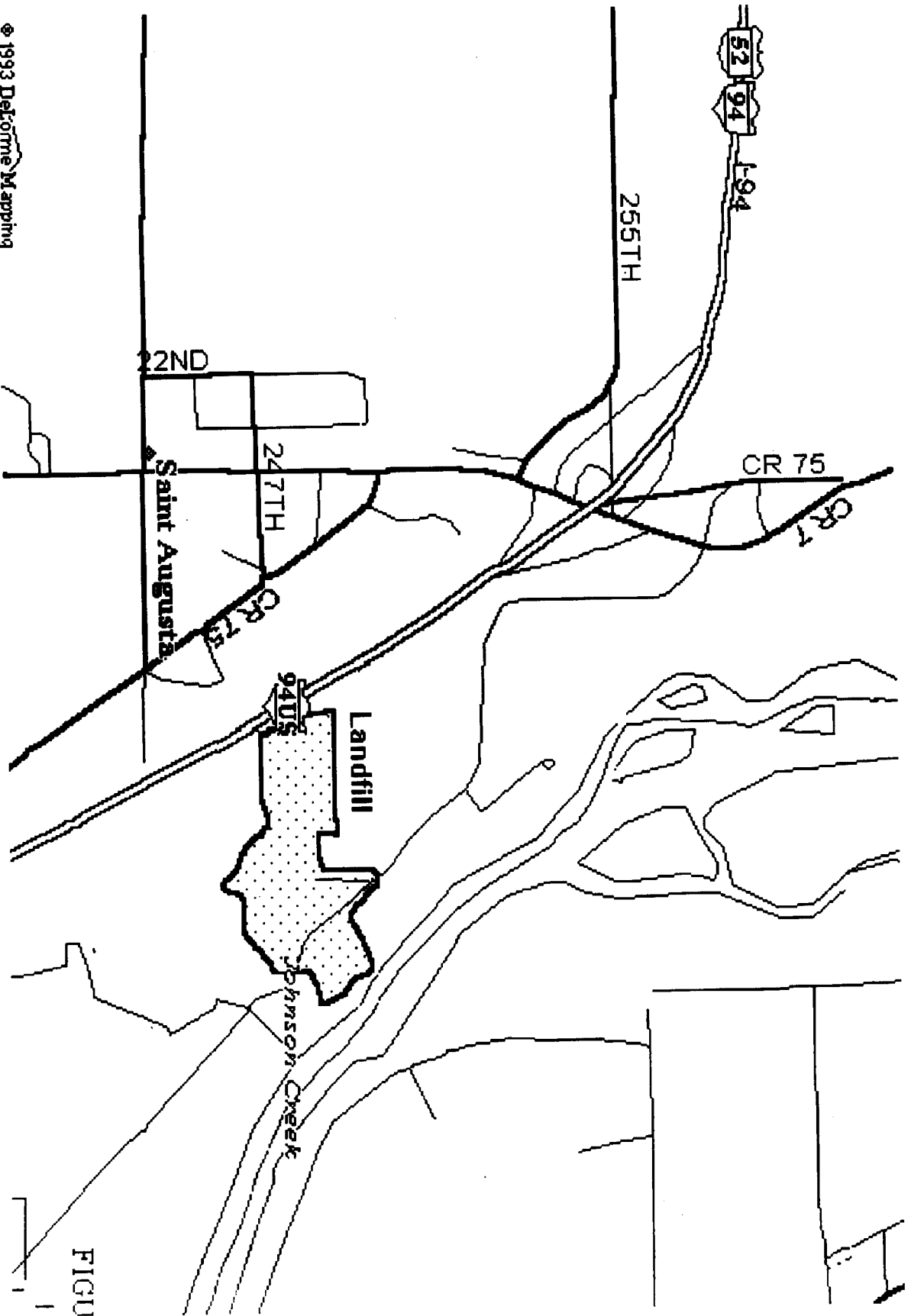
X. Next Review

The next five-year review for the Site is required by May 2008, five years from the date of this review.

TABLE 4

METHANE LEVELS AT ST. AUGUSTA LANDFILL
(Percent Methane)

PROBE	9/6/99	4/20/00	8/22/00	10/10/00	5/31/01	11/5/01
GP-1	0.1	0.3	0.1	0	0	0
GP-2	0.1	0.3	0.2	0	0	0
GP-3	0.3	0.3	0	0	0	0
GP-4	30.1	26.8	3.9	11.2	35.5	19.9
GP-5	0	0	0.1	0	0	0
GP-6	58.4	59.5	57.4	55.3	58.7	54.6
GP-7	52.4	43.5	56.2	51.3	45	50.1
GP-8	38	14.1	27.8	26.6	20.2	19.3
GP-9	48.9	25.2	35.9	27.4	35.4	40.2



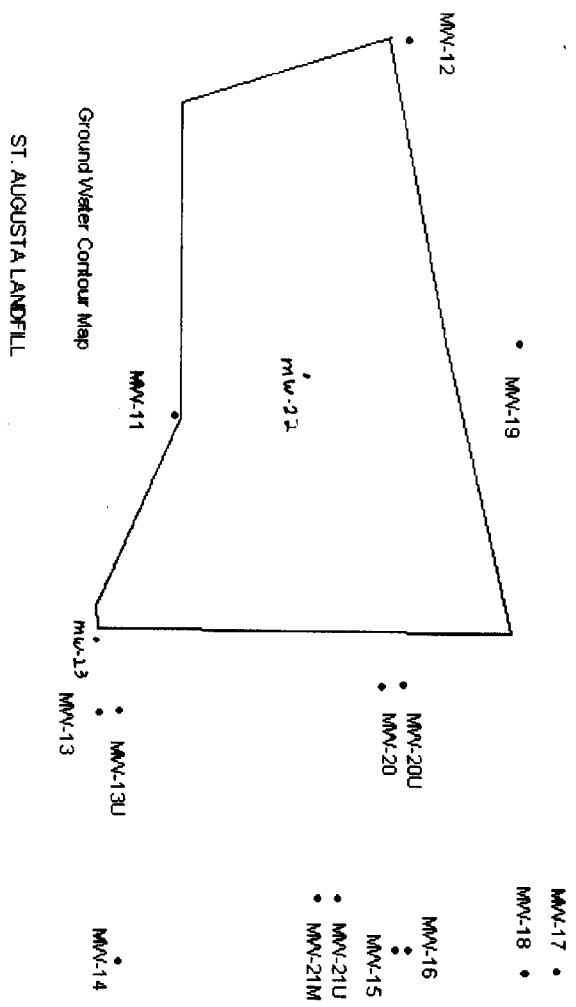


FIGURE 2

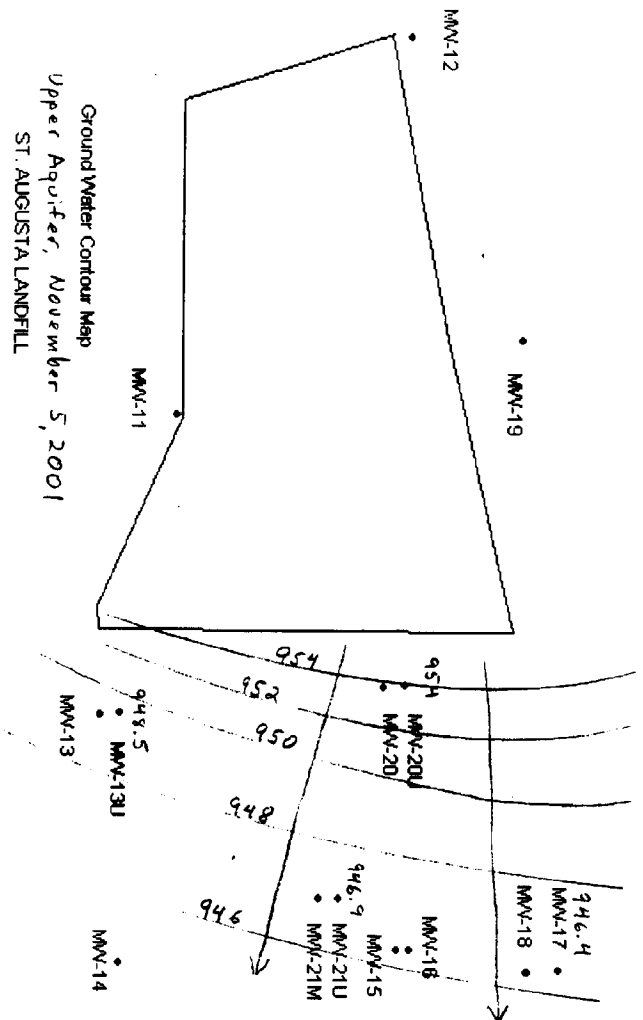


FIGURE 13

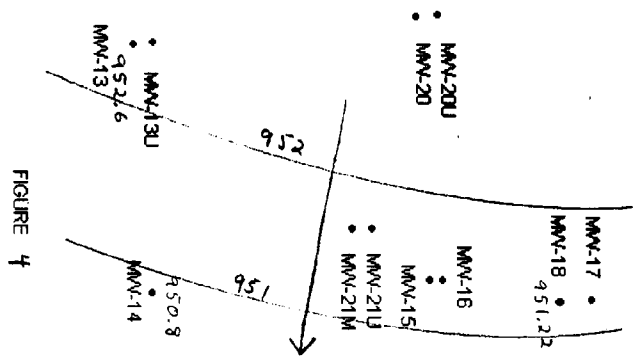
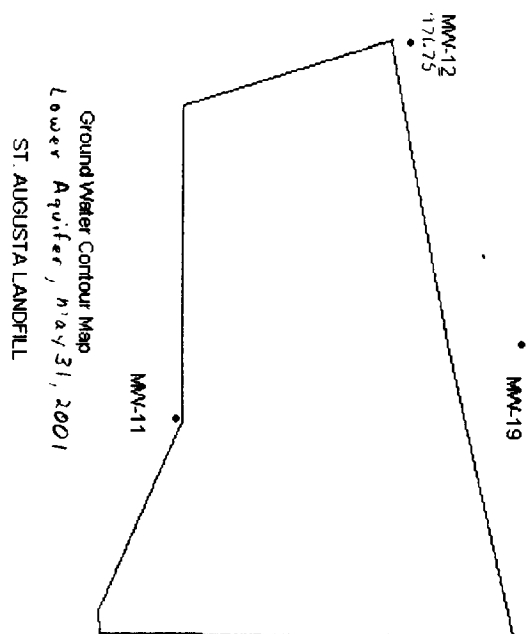


FIGURE 4

FIGURE 5
TOTAL VOC AND CHLORIDE CONCENTRATIONS AT MW-17

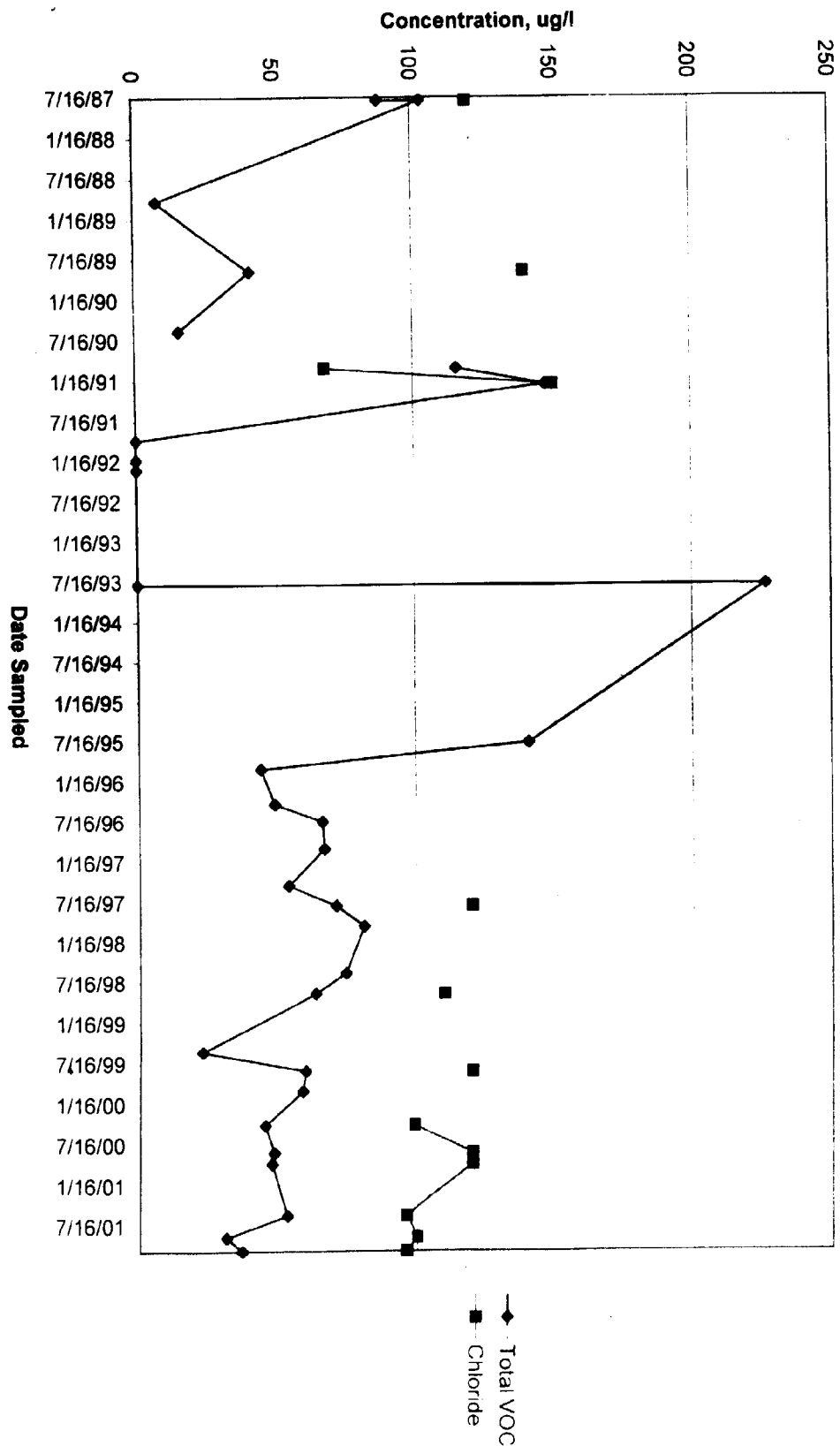


FIGURE 6
Total VOC & Chloride Concentrations at MW-14

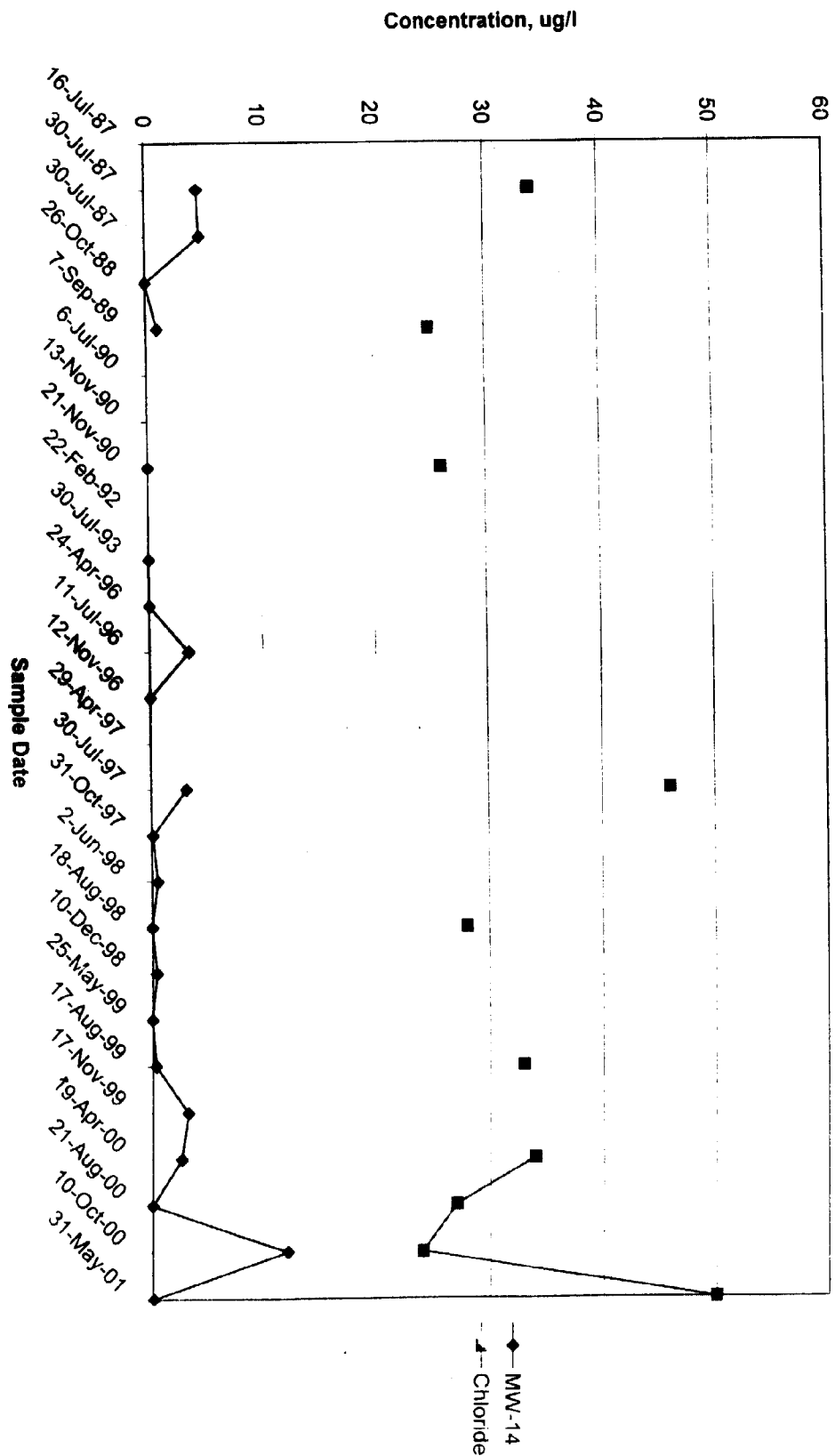


Figure 7
Total VOC

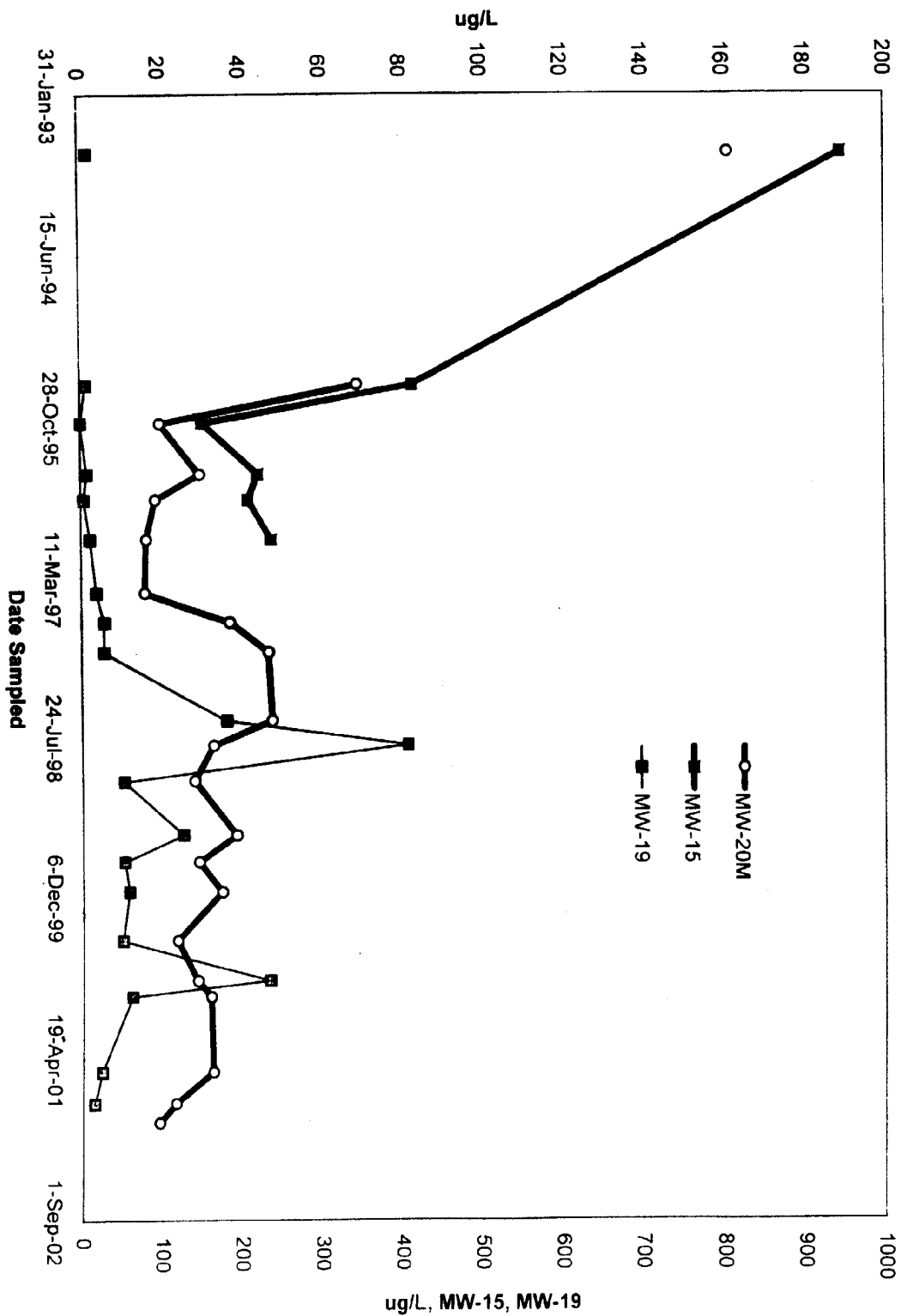


Figure 8

